Supporting Information

Lattice-strained metal-organic frameworks synthesized by microwave assisted promote oxygen evolution reaction

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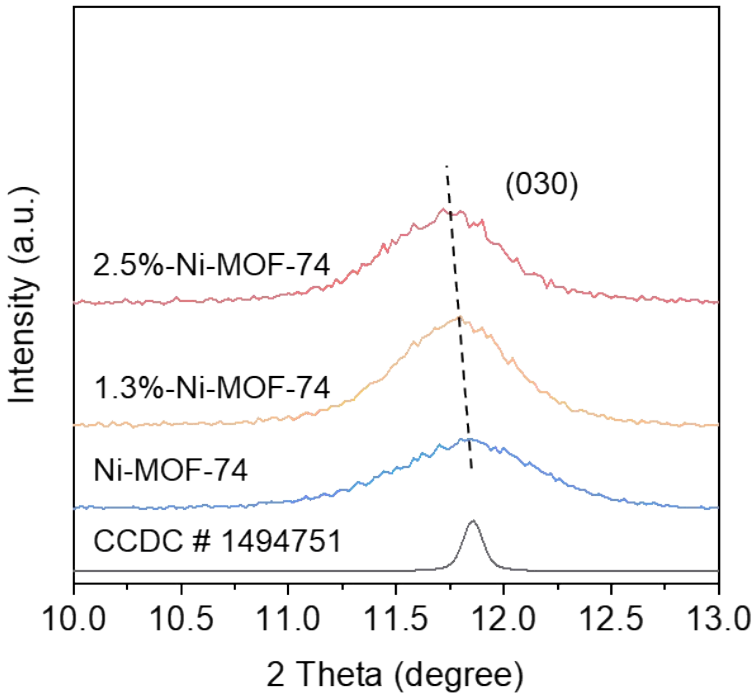

Fig. S1. XRD pattern for Ni-MOF-74, 1.3%-Ni-MOF-74 and 2.5%-Ni-MOF-74 of (030) plane.

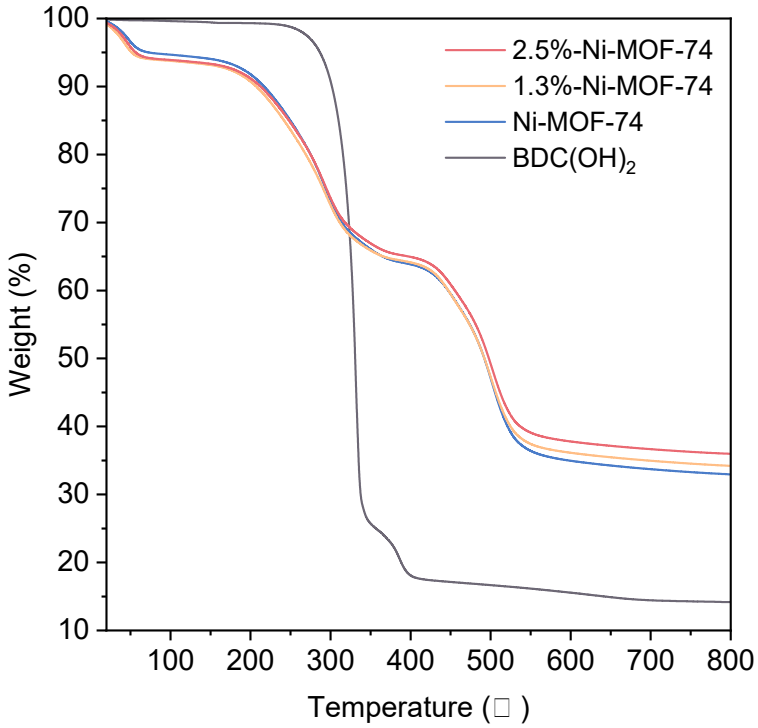

Fig. S2. TG diagram of the as synthesized MOFs and $BDC(OH)_2$.

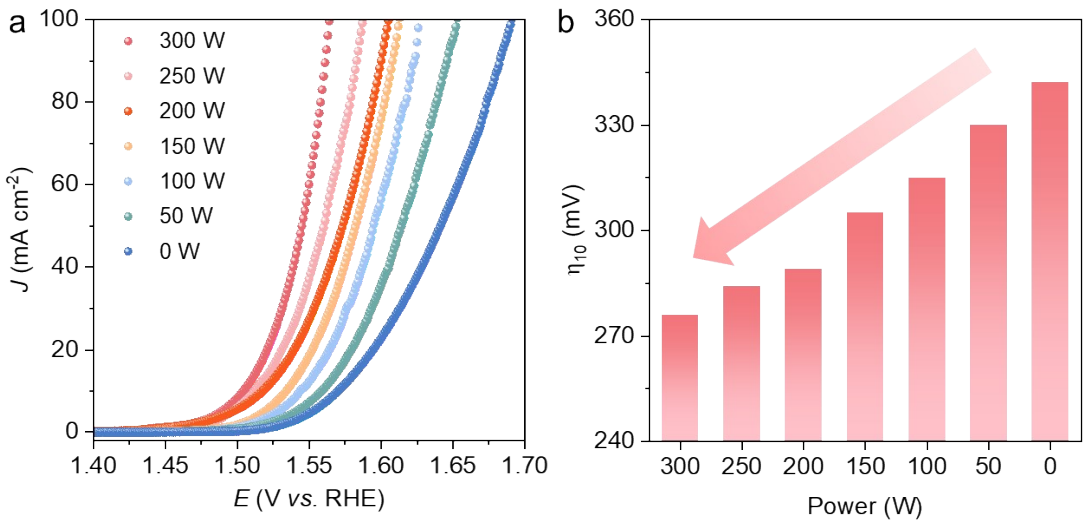

Fig. S3. (a) (a) Linear sweep voltammetry curves of as synthesized Ni-MOF-74 with different powers and (b) the corresponding overpotential of 10 mA cm^{-2}.

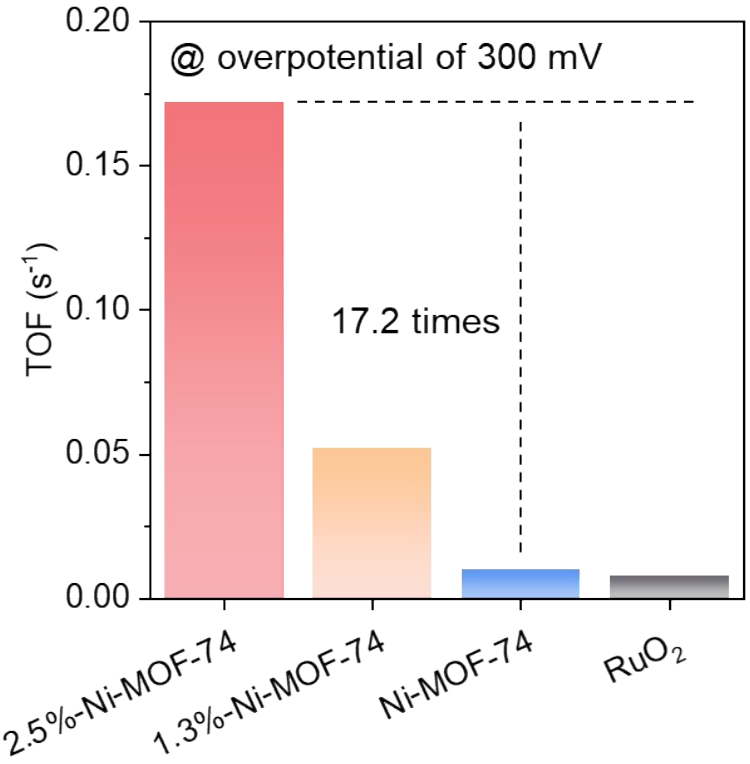

Fig. S4. TOF of OER for the Ni-MOF-74, 1.3%-Ni-MOF-74 and 2.5%-Ni-MOF-74 and RuO_2 at overpotential of 300 mV.

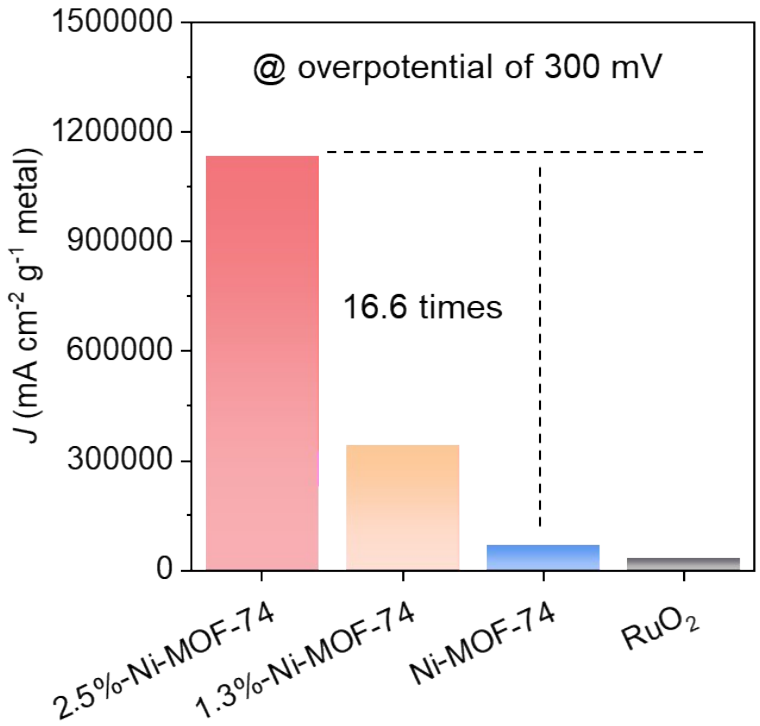

Fig. S5. Mass activity of OER for the Ni-MOF-74, 1.3%-Ni-MOF-74 and 2.5%-Ni- MOF-74 and RuO_2 at overpotential of 300 mV.

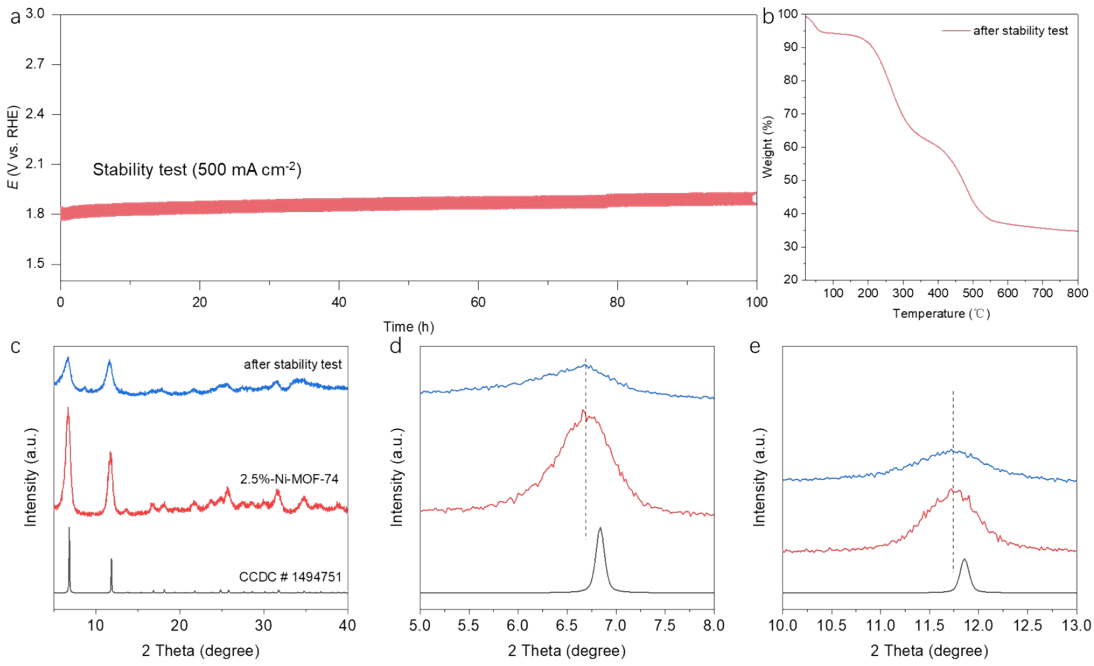

Fig. S6. (a) Stability test again of 2.5%-Ni-MOF-74 measured in 1 M KOH using a H-type cell at 500 mA cm^{-2}. (b) TG diagram of 2.5%-Ni-MOF-74 after stability test (100 h @ 500 mA cm^{-2}). (c)-(e) XRD pattern of 2.5%-Ni-MOF-74 after the stability test.

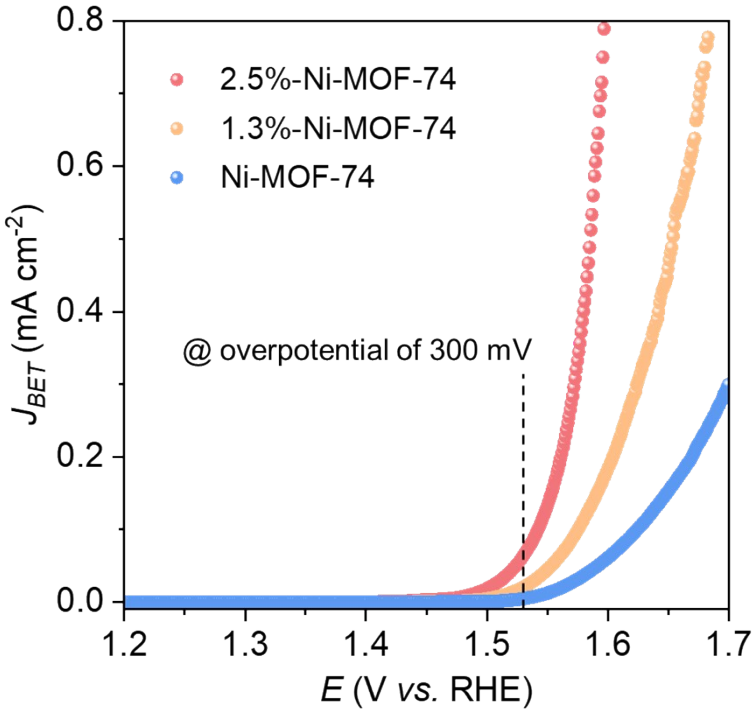

Fig. S7. Specific activity of OER normalized by surface area.

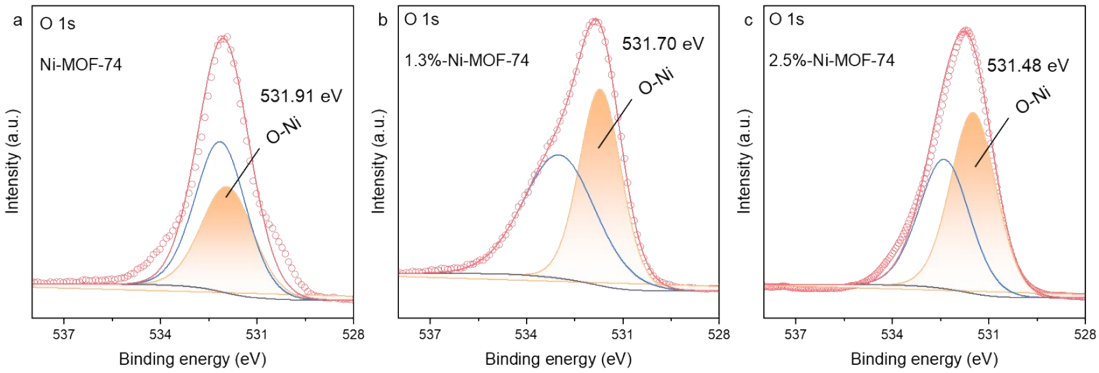

Fig. S8. Fitted O 1s XPS spectra of the (a) Ni-MOF-74, (b) 1.3%-Ni-MOF-74 and (c) 2.5%-Ni- MOF-74.

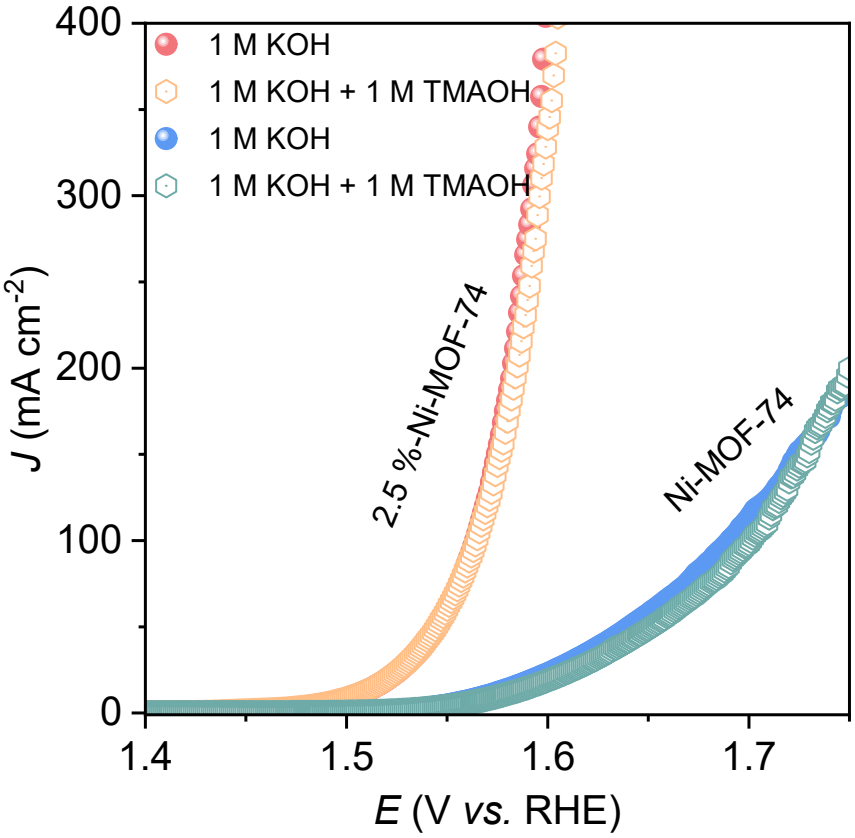

Fig. S9. Linear sweep voltammetry curves of 2.5%-Ni-MOF-74 and Ni-MOF-74 nanoplates in 1 M KOH and 1 M KOH + 1 M TMAOH solutions.

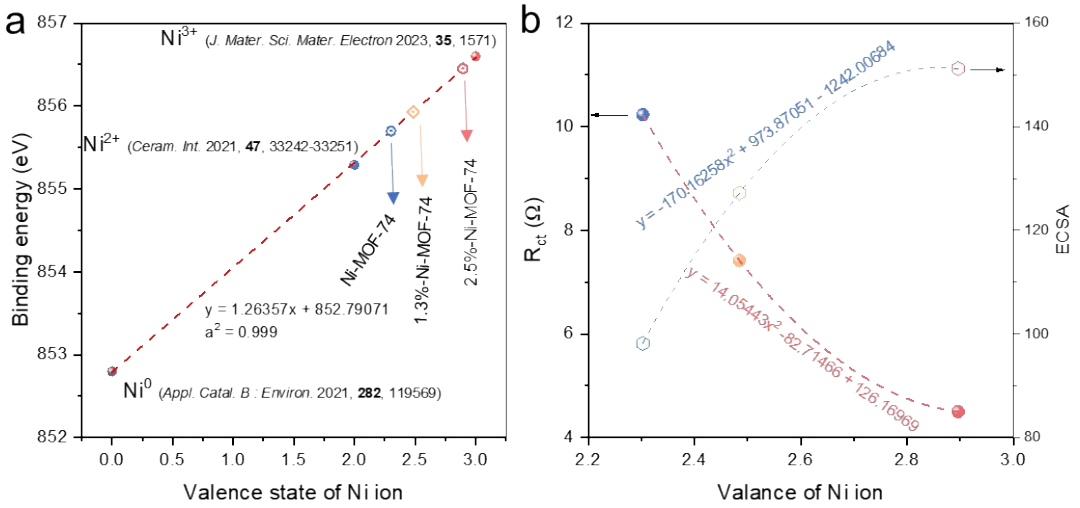

Fig. S10. (a) The valence state of Ni fitted based on the reported XPS results. (b) Mathematical models of Ni valence states between R_{ct} and ECSA respectively.

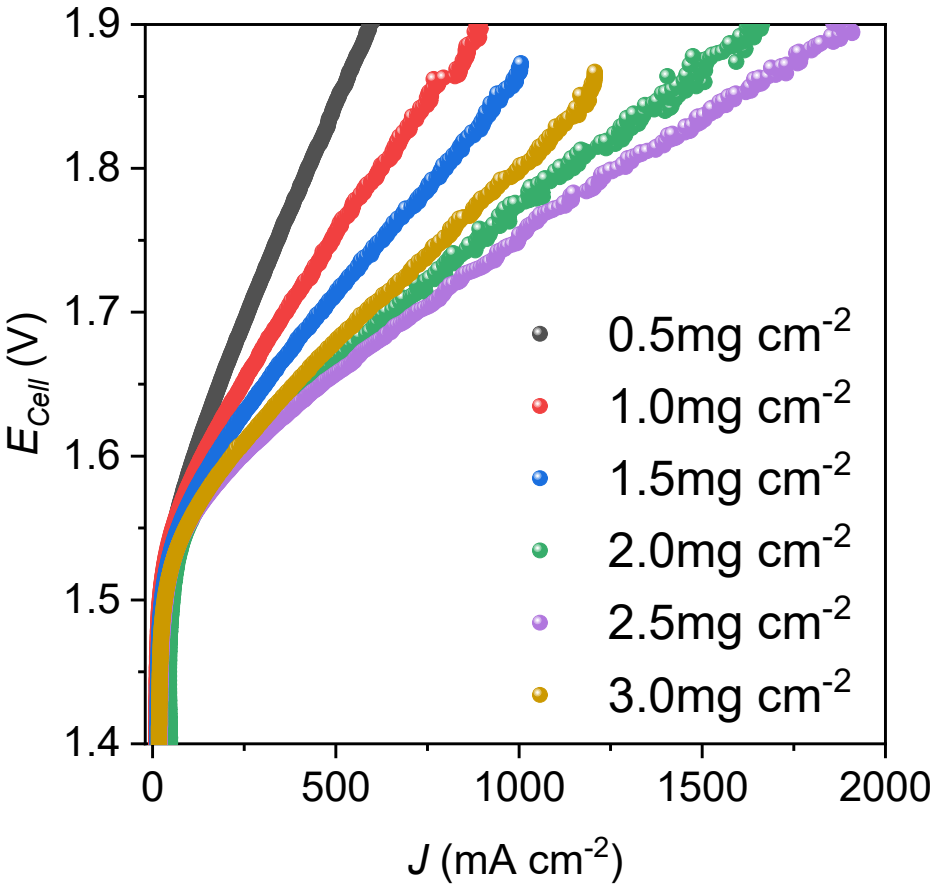

Fig. S11. LSV curves of anodes with different loading capacities.

Table S1. The Ni contents of catalysts, measured by ICP-OES.

Catalyst	Ni content (wt. %)
Ni-MOF-74	24.33
1.3%-Ni-MOF-74	23.46
2.5%-Ni-MOF-74	23.67

Table S2. The TOF and MA of catalysts.

Catalyst	TOF (s^{-1}) @ 300 mV	MA (A g^{-1} metal) @ 300 mV
Ni-MOF-74	0.172	1133.580
1.3%-Ni-MOF-74	0.052	344.032
2.5%-Ni-MOF-74	0.01	68.779
RuO_2	0.008	32.969

Table S3. The C_{dl} of catalysts.

Catalyst	2.5%-Ni-MOF-74	1.3%-Ni-MOF-74	Ni-MOF-74
C_{dl} (mF cm^{-2})	7.54	6.36	4.91
ECSA=C_{dl}/C_s	151.2	127.2	98.2

Table S4. The EIS of catalysts.

Catalyst	R_s (Ω cm^{-2})	R_{ct} (Ω cm^{-2})
2.5%-Ni-MOF-74	1.71	4.50
1.3%-Ni-MOF-74	1.68	7.42
Ni-MOF-74	1.55	10.23

Table S5. Comparison of OER performance between 2.5%-Ni-MOF-74 and reported catalysts in literatures.

Catalysts	η_{10} (mV)	Tafel slope (mV dec^{-1})	Substrate	Stability (h) @ J (mA cm^{-2})	Ref.
2.5%-Ni-MOF-74	276	54.6	Carbon paper	290 @ 500	This work
$Fe(OH)_3$@Co-MOF-74	292	44	GCE	20 @ 50	*ChemSusChem*. 2019, **12**, 4623-4628
FeCo-MNS-1.0	298	21.6	NF	14 @ ~120	*Angew. Chem. Int. Ed.* 2019, **58**, 13565-13572
NiO-MOF-74	320	105	GCE	10 @ 10	*J. Mater. Chem. A* 2018, **6**, 18720-18727
$Co_{0.6}Fe_{0.4}$-MOF-74	280	56	RDE	12 @ ~12	*ACS Energy Lett.* 2018, **3**, 2520-2526
Fe-MOFs	283	41.6	NF	24 @ 100	*ChemCatChem*. 2021, **13**, 4976-4984
(U+S)-CoFe-MOF	277	31	GCE	/	*ACS Sustain. Chem. Eng.* 2019, **7**, 16629-16639
Ni-BDC@NiS	330	62	Ni	12 @ 20	*ACS Appl. Mater. Inter.* 2019, 11, 41595-41601